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ABSTRACT

This handbook is the fifth in a series of five competency-based resource guides on microcomputer applications for vocational teachers. The four units of instruction in this handbook are concerned with the content of the 10 competencies included in the category, "Performing Classroom Management Functions with Competency-Based Instruction." Unit topics are (1) determining classroom management activities; (2) maintaining classroom rosters, attendance records, and inventories; (3) generating tests, scoring tests, and recording grades or performance progress; and (4) managing a vocational student organization. Components of each unit include unit and specific objectives, informative material, sample forms and evaluation measures, examples, a summary, achievement indicators, and a list of references. (YLB)

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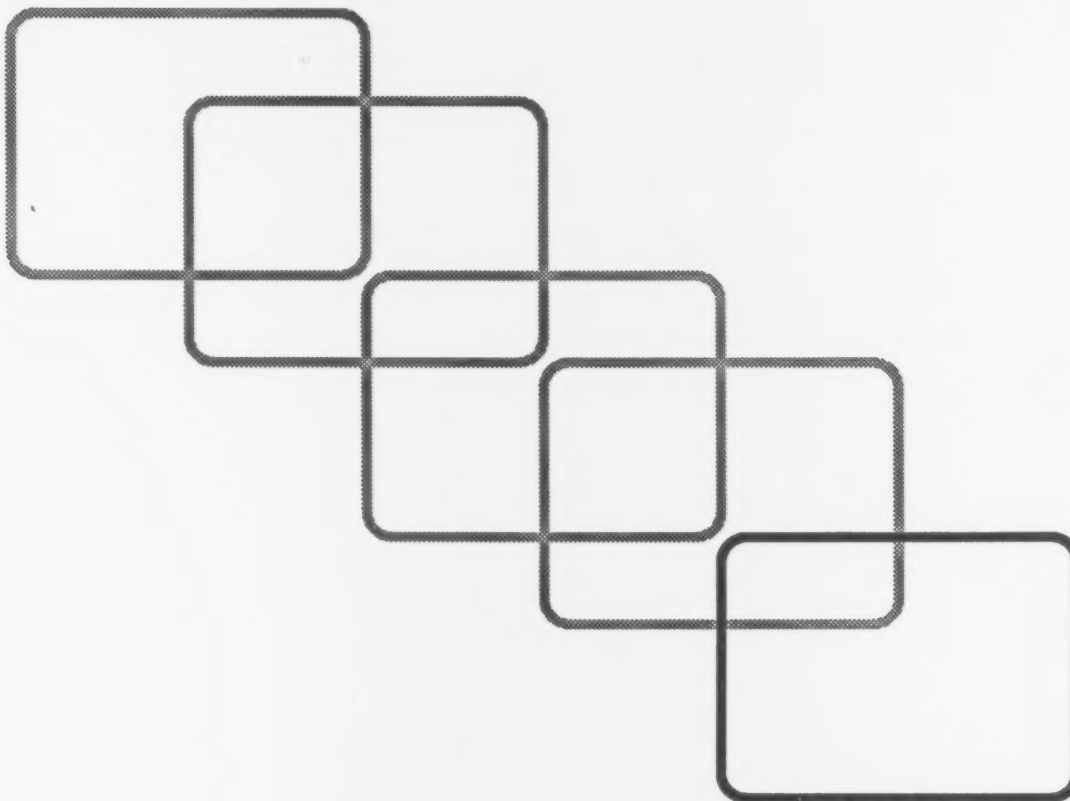


**Performing Classroom
Management Functions
with Competency-Based
Instruction**

Illinois
State Board of
Education

Adult,
Vocational and
Technical Education

ED281025



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Microcomputer Applications for Vocational Teachers: A Competency-Based Approach - Book E

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**Performing Classroom
Management Functions with
Competency-Based Instruction**

Illinois
State Board
of Education

Department of
Adult,
Vocational and
Technical Education

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The foundation for this handbook was laid by a panel of Illinois vocational educators. Individuals were selected to serve on this panel on the basis of demonstrated leadership in the use of microcomputers. Utilizing a structured process known as DACUM (Develop A Curriculum), this group developed the initial competency list for the handbook and field tested the product. The DACUM participants included:

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INTRODUCTION

Microcomputer Applications For Vocational Teacher: A Competency-Based Approach

BY:

DR. GENE L. ROTH

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Historically, vocational educators have had to cope with the problem of keeping pace with technology. Preparing students for a workplace that is continually changing is a constant reminder to vocational instructors that they do not have the luxury of resting on previously learned work skills and knowledge. Vocational educators must keep abreast of contemporary developments within their vocational area of expertise.

This concern for technical updating is not limited to industrial or business applications of technology. In addition to concerns about preparing students for a changing world of work, vocational teachers must contend with applications of new instructional technologies. Many vocational teachers are currently struggling with how to integrate computer-based instruction into their classrooms and laboratories.

The rapid influx of microcomputers into vocational classrooms and laboratories has caught many vocational educators unprepared to effectively utilize this contemporary instructional technology. As educational systems continue to acquire computer technology, many vocational instructors are saying, or at least thinking, "Where do we start with these machines?" Microcomputers are often purchased for vocational programs which are staffed by personnel that have not been appropriately trained in the technology. Their knowledge of hardware and software may be quite limited. A resulting danger is that microcomputers will be misused or not used at all because vocational teachers have been inadequately acquainted with educational computing (Pratscher, 1983).

This concern about providing vocational educators with pertinent information related to microcomputer applications has brought about a collaborative effort between two state offices of vocational education. The Illinois State Board of Vocational Education, Department of Adult, Vocational, and Technical Education and the Idaho State Board of Education, Division of Vocational Education are jointly supporting this research and development project entitled "Microcomputer Applications for Vocational Teachers: A Competency-Based Approach." This project, which has been conducted at Idaho State University, features a systematic approach to the identification of microcomputer competencies for vocational instructors (Roth & Tesolowski, in press).

The DACUM Process: A Method for Identifying Microcomputer Competencies

The DACUM (Developing A Curriculum) process (Adams, 1975) was utilized by this project as a foundation in the development of competency-based materials on microcomputer applications for vocational instructors (Roth, Tesolowski, Rankin, & Blackman, 1984). This procedure is based on three assumptions: (a) expert workers can define and describe their jobs more accurately than anyone else; (b) any job can be effectively described in terms of the tasks that successful workers in that occupation perform; and (c) all tasks, in order to be performed correctly, demand certain knowledge and attitudes from workers (Miller-Beach, 1980).

Utilization of the DACUM process required the project to assemble a panel of 12 vocational educators. The 12 members, all from Illinois, included 4 secondary vocational instructors, 4 post-secondary vocational instructors, 3 secondary vocational administrators, and 1 representative of the Department of Adult, Vocational, and Technical Education. In addition to being practitioners in the field of vocational education, these individuals have been recognized as leaders in the state of Illinois at applying microcomputers in their work. The challenge for the DACUM panel was to identify competencies specific to the application of microcomputers in vocational education. This was accomplished through a process of competency identification and consensus decision-making. The activity involved the panelists and the facilitator in two days of difficult work. However, the panelists were rewarded for their efforts as competencies were established for each category and the final profile of microcomputer applications for vocational educators unfolded. Furthermore, the panelists began to realize that they had increased their own personal level of knowledge about the application of microcomputers in vocational education.

RESULTS OF THE DACUM PROCEDURE

Most vocational teachers recognize the vast potential of microcomputers in vocational education. However, many professionals have had difficulty identifying the precise role of the machine in their professional lives. The DACUM profile provides teachers with a graphic portrayal of how the microcomputer integrates with the overall schema of vocational instruction and curricula. The profile consists of 47 competencies clustered within the following 5 categories (Table 1):

- A. Developing a personal plan for microcomputer competency.
- B. Integrating computer-based instruction (CBI) into vocational curricula.
- C. Planning, executing, and evaluating CBI.
- D. Planning and organizing vocational education learning environments for CBI.
- E. Performing classroom management functions with CBI.

VOCATIONAL TEACHER COMPETENCY PROFILE FOR MICROCOMPUTER APPLICATIONS

Illinois State Board of Education
Department of Adult, Vocational and Technical Education
Idaho State Board of Vocational Education
Division of Vocational Education

Dr. Gene L. Roth
Project Director
Dr. Dennis G. Tesolowski
Dr. Roger A. Rankin
Dr. Harold S. Blackman

Competencies

Category									
A	Developing a Personal Plan for Microcomputer Competency	A 1 Define Elements of a Local Education Agency (LEA) Plan for Computer Based Instruction (CBI)	A 2 Define the Vocational Instructor's Role in the LEA Plan for CBI	A 3 Conduct a Personal Assessment of Microcomputer Competency	A 4 Set Personal Goals for Microcomputer Competency	A 5 Construct a Personal Plan for Microcomputer Competency	A 6 Implement a Personal Plan for Microcomputer Competency	A 7 Evaluate Personal Plan Based on Computer Innovations	A 8 Modify Personal Plan as Needed
		3 67	4 00	3 90	4 11	4 06	4 16	3 87	3 97
B	Integrating CBI into Vocational Curricula	B 1 Identify Job-Specific Applications of Microcomputers for inclusion in Vocational Curricula	B 2 Identify Educational Applications of Microcomputers for inclusion in Vocational Curricula	B 3 Develop a Plan to Apply CBI to Vocational Curricula	B 4 Demonstrate an Awareness of Microcomputer Software for Developing Computer Based Vocational Curricula	B 5 Write Specifications for Hardware/Software Based on Vocational Curricula Requirements	B 6 Implement a Plan to Apply CBI to Vocational Curricula	B 7 Evaluate Applications of CBI in Vocational Curricula Based on Innovation in Computer Technology & Work	B 8 Modify Applications of CBI in Vocational Curricula as Needed
		4 42	4 37	4 38	4 22	3 77	4 26	3 95	4 04
C	Planning, Executing & Evaluating CBI	C 1 Differentiate Among Applications of CBI (Such as Drill & Practice, Tutorial, Simulation & Problem Solving)	C 2 Assess Students' Needs for Specific CBI Applications	C 3 Develop Lesson Plans Incorporating CBI	C 4 Select Appropriate Software for Specific Instructional Purposes	C 5 Modify Simple Software for Specific Instructional Purposes	C 6 Develop Software for Specific Instructional Purposes	C 7 Prepare Instructional Materials to Accompany Software	C 8 Modify Software Documentation for Specific Instructional Purposes
		3 84	4 15	4 22	4 61	3 71	3 38	4 22	3 77
D	Planning, Executing & Evaluating CBI (Con't)	C 9 Orient Students to CBI	C 10 Execute CBI	C 11 Individualize Instruction with CBI	C 12 Assess Student Microcomputer Skills	C 13 Evaluate Effectiveness of CBI Based on Student Achievement	C 14 Modify CBI as Needed		
		4 43	4 39	4 17	4 02	4 21	4 10		
E	Planning & Organizing the Vocational Education Learning Environment for CBI	D 1 Develop a Plan to Implement CBI in Vocational Education Learning Environments	D 2 Schedule CBI Activities	D 3 Project Resource Needs (Supplies, Materials, Equipment) for CBI	D 4 Provide Microcomputer Maintenance	D 5 Establish Microcomputer User Security	D 6 Establish Microcomputer Hardware/Software Security	D 7 Create Authorized Back-up Copies of Microcomputer Software	
		4 11	3 97	4 02	3 69	3 72	3 84	4 40	
F	Performing Classroom Management Functions with CBI	E 1 Determine Classroom Management Activities to be Performed with CBI	E 2 Select Software for Classroom Management Activities	E 3 Prepare Software for Classroom Management Activities	E 4 Maintain Classroom Rosters	E 5 Maintain Attendance Records	E 6 Generate Tests	E 7 Score Tests	E 8 Record Grades or Performance Progress
		4 13	4 28	3 57	3 44	3 39	3 83	3 53	3 88
		Competency Rating Scale							
G	Performing Classroom Management Functions with CBI (Con't)	E 9 Maintain Inventory of Teaching Supplies, Materials & Equipment	E 10 Manage Vocational Student Organizations	The relative importance of these 47 competencies was determined by surveying a national sample of 134 vocational educators. Vocational instructors included in this sample were identified as experts at applying microcomputers in their programs by their respective state supervisors. Ninety seven (97) vocational teachers (72%) responded to this survey. The following vocational disciplines were represented by this sample: agriculture, business, home economics, marketing and distribution, trade and industrial, and health occupations education. Mean (x) competency ratings were derived from respondents' ratings based on the following scale:					
		3 91	3 49	1 = No Importance 2 = Minimal Importance 3 = Average Importance 4 = High Importance 5 = Extreme Importance					

The content of these 47 competency statements was refined and validated through a formative process. After the DACUM panel had generated the core of this profile, the competency statements were scrutinized and revised by: (a) members of the project team at Idaho State University; (b) a group of vocational educators in Idaho; (c) consultants of the Illinois Department of Adult, Vocational, and Technical Education; and (d) supervisors and staff members of the Idaho Division of Vocational Education.

A survey was conducted by this project's research team to ascertain the relative importance of each of the 47 microcomputer competencies. The survey population consisted of a national sample of 134 vocational educators. These instructors were identified by their respective State Supervisors as leaders in their states at applying microcomputers to the roles and responsibilities of their teaching jobs. Ninety-seven vocational teachers (72%) responded to the survey.

Ratings for each competency are listed on the *Vocational Teacher Competency Profile for Microcomputer Applications* (Table 1). Mean (x) competency ratings were derived from respondents' ratings on the following scale: (1) no importance, (2) minimal importance, (3) average importance, (4) high importance, and (5) extreme importance. Vocational teachers can consider these ratings as benchmarks as to how their peers view microcomputers in vocational teaching.

Instructional units have been packaged in this competency-based resource guide on microcomputer applications for vocational teachers. This handbook is being disseminated by the Curriculum Publications Clearinghouse, Western Illinois University, Macomb, IL 61455.

UTILIZING A "PROFESSIONAL DEVELOPMENT PLAN" TO INTEGRATE MICROCOMPUTERS INTO VOCATIONAL CURRICULA AND INSTRUCTIONAL STRATEGIES

Vocational educators can carefully examine Category A in the profile (Table 1) and begin to envision how the content of the eight competencies included in this category will enable them to develop a personal plan for microcomputer competency (Tesolowski, Wallin, Roth, & Rankin, 1984). Competency A.1 defines the elements and planning strategies involved in developing a comprehensive plan for implementing computer-based instruction (CBI) in a local education agency (LEA). This instructional unit presents practices that have been implemented in select exemplary programs in the nation. Competency A.2 explores the vocational instructor's role in the plan identified for implementing CBI in the LEA (A.1). Varying practices are reviewed in Unit A.2, which will assist vocational teachers in preparing a microcomputer implementation plan.

The content included in Competency A.3 enables vocational educators to assess their personal levels of microcomputer competency. Self-report test items are included for a representative set of pertinent content areas or domains related to computer literacy. Vocational teachers can identify their strengths and weaknesses on the basis of this self-assessment measure. Upon completing this diagnostic-prescriptive instrument, vocational educators can profile their results on a chart. On the basis of their strengths and weaknesses, vocational instructors can set initial personal goals (Competency A.4) for microcomputer competency.

Competency A.5 facilitates the development of a personal plan for microcomputer competency. Vocational teachers who participate in this unit of instruction are encouraged to develop a Professional Development Plan that includes long-range goals; short-term objectives; and the identification of instructional strategies, methods techniques, materials, and resources that will facilitate the accomplishment of these goals and objectives. In addition, participants will monitor their timeline in regards to when they initiate and conclude selected learning activities. Finally, vocational teachers will record whether or not they believe they have successfully achieved their goals and objectives. Competencies A.6, A.7, and A.8 assist vocational educators in working through the processes of implementing, evaluating, and modifying their personal plans for microcomputer competency.

After vocational instructors construct their Professional Development Plans for microcomputer competency (A.5), they can implement their plans by fully utilizing all of the units of instruction for the 39 competencies clustered in Categories B, C, D, and E. An alternative to using all of the units of instruction is to selectively choose units based on the needs identified in the personal plans, their district's or school's needs, and their personal interests (Roth, Tesolowski, Rankin, & Blackman, 1984).

THE NEED FOR A PERSONAL COMMITMENT TO APPLY MICROCOMPUTERS IN VOCATIONAL EDUCATION

Competencies identified for this handbook can serve as an invaluable starting point for vocational instructors who want to integrate microcomputers into their professional future. Vocational educators can visually inspect the categories and respective competencies, examine their own teaching situations, and begin to formulate their own individualized plans for applying microcomputers in their programs as well as in their personal lives.

The stage is now set for vocational educators to decide where and how microcomputers will fit into their teaching futures. Competencies identified through this research project can enhance their perspectives of the potential of microcomputers in vocational education. However, vocational teachers must individually develop personal plans for microcomputer competency that will serve their professional needs as well as the needs of their respective programs.

The decision to develop a plan or not is of utmost importance. Plans can be modified as teachers' computing interests and programmatic needs change with the times. Whatever vocational educators personally decide to do, they should not allow this contemporary technology to pass them by. All vocational teachers must critically examine the role of microcomputers in their professional lives.

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Unit 1

Determining Classroom Management Activities

UNIT OBJECTIVES

Upon completion of this unit, the learner will be able to determine customer related activities applicable to the classroom and be able to select appropriate classroom management material (including hardware and software packages). This knowledge will be demonstrated through completion of the achievement indicators and by preparing a written plan to select materials.

SPECIFIC OBJECTIVES

Upon completion of this unit, the learner will be able to:

- 1) List eight general steps in the instructional cycle.
- 2) Describe the steps which are directly related to computer application in the classroom.
- 3) Discuss the capabilities of hardware which need to be considered with selecting classroom management material.
- 4) Discuss factors to be considered when selecting the software to be used in classroom management activities.
- 5) Compare DBMS software using selected characteristics to determine the specific attributes desired.
- 6) Describe the elements of student's records which can be managed by computer applications and discuss other factors to be considered when setting up a CMI system.
- 7) Identify various elements of DBMS packages which should be compared when selecting software as management tools for vocational classrooms.
- 8) Develop a plan for implementing classroom management activities in a typical vocational program.

Determining Classroom Management Activities

BY: DR. DONALD ESHELBY

Instructional Cycle

A general understanding of the educational process will help teachers understand the involvement of computers in the overall management of classroom activities. The computer's potential role in the process is a varied one and crucial to the effective evaluation of the process. A general understanding of the problems associated with the design of computer-based materials is therefore needed.

The following are the eight steps in a typical educational process or cycle:

1. Educational goals and curriculum objectives
2. Specification of content
3. Analysis of content
4. Definition of instructional objectives
5. Selection of teaching strategies or methods
6. Design and implementation
7. Delivery
8. Assessment or evaluation.

Educational goals, established within the community by the society at large, generally do not change quickly. Curriculum objectives, established by the goals of the system, are reflective of global issues. The management of objectives can be a relatively easy task for a computer-based system. The measurement of the objectives outcomes is evaluation.

The content specifications determine what is to be taught and what areas of knowledge and skills will comprise the curricula. These are usually precisely defined at the operational level. Content analysis consists of the establishment of behaviorally oriented objectives. If an adequate job of analyzing concepts and defining tasks is done, the chances of formulating and sequencing clear behavioral objectives are greater. This is the best way to ensure the quality of all instruction, including computer-based instruction.

The tasks which must be performed to demonstrate understanding and mastery of the content are identified when one defines the instructional objectives. All teachers must decide which behavior is acceptable as evidence of learning. Good, clear behavioral objectives are critical to the successful outcome of computer-based instruction.

Teaching strategies and methods determine how to present the material to the students in the best ways to facilitate learning. The selection must be appropriate for the learner, the content, and for the delivery process. Films, textbooks, slides, lectures, and other methods must fit the design and the topical area being presented, or effective learning will not take place.

The design and implementation of the method selected involves arranging the content and activities in a manner which is best suited to the class. Feedback from students is often used by experienced instructors to modify the design. Well documented design is extremely critical to the success of non-teacher delivered materials because those materials lack the intelligent response and flexibility of the teacher. These materials include films, laboratory settings, and computer-based instruction.

Delivery of the material relates to the physical method used in the classroom or learning setting. The skill and flexibility of a good instructor cannot be matched exactly by machine-based methods. The design of a machine-based system requires more critical design factors.

The assessment or evaluation of learning can be either formative or summative. Formative evaluation is ongoing and more effective at the point of delivery (during the class) because it involves feedback, thus providing constant quality control. Summative evaluation, which occurs at the end of a session, has both inherent delay problems and long-term impact results. Summative evaluation is usually used to modify the objectives of the program because it includes the cumulative results of daily feedback as well as an overall assessment of the outcomes.

Computer-based classroom management includes most of the eight steps listed, but does not directly involve goals except through the measurement of accomplishment of those goals. One must consider the design of the system to effectively utilize computer-assisted instruction. The methods of delivery will be affected by computer-based instruction. Also, the achievement of objectives and daily learning can be monitored by computers. The grading or scoring of tests can be similarly accomplished by computers in the classroom.

Role of The Computer

Computer compatibility must be matched to instructional needs. The fact that a computer can be used in a classroom does not mean that it should be used in a classroom. The computer has played a significant role in the delivery and evaluation phases of education, but a new element has been introduced which makes the computer even more suitable for classroom use: management. Every step in the educational process, with the possible exception of setting goals, can be effectively managed by computer-related activities. The most significant computer role may lie in the testing mode, but equally effective practices exist for grading and recording tasks, content analysis, student assignment and progress, objective matching, inventory for laboratory and classroom settings, and, of course, instructional assistance by CAI.

Three elements associated with computer-based instruction must be addressed prior to implementing such a process in the class setting: a) the selection and capabilities of hardware needed in the process; b) the selection of software packages; and c) the design and production of instructional material.

Hardware Considerations

The person implementing computer-based education must have a thorough awareness of the capabilities of the various hardware items needed. A thorough analysis of hardware selection is contained in Unit B.5. The selection of hardware is dependent on decisions made regarding the delivery methods and content. If color, graphics, sound, light pens, or other specialized features are necessary, one must be aware of the capabilities of equipment to deliver color, graphics, etc. The implementor should have some knowledge of utilities, operating systems, and some programming language; otherwise, the equipment will not function properly.

Questions dealing with workstation needs must be answered: How will the information be entered into the computer? How will the information be presented to the student? What is the machine's capacity?

Software Considerations

The software issues involving CAI and CMI cannot be overlooked when embarking on a plan to implement computer managed instruction or classroom management. CAI relates solely to the delivery of lessons and materials used in the classroom. With the emphasis on CAI, it is imperative that effective management systems be utilized. Without adequate CMI capability, there will be a lack of accurate and dependable records with which to assess student progress or performance. The lack of control of these elements and the subsequent loss of evaluative data will prevent the instructional process of CAI from taking its place in the classroom as the primary delivery system. Therefore, when one considers using computers in the classroom, it is critical to design a system which adequately includes both CAI and CMI software. The process of selecting software is further reviewed in Unit C.4.

Good educational software should be able to correct all types of program errors or operator miscues. Programs need to be forgiving and unbreakable, without causing the session to terminate because of student mistakes. The most frequent complaint lodged against software involves response paths. For example, some programs do not allow for the correction of misspellings or capitalization errors, which can be most disagreeable to students. Programs which afford a chance for correction are the favorable choice. These programs generally utilize a higher programming language or a more sophisticated branching procedure, and therefore can cost more. The more effective the software, the more effective the CMI results because students are not penalized for oversights or typing errors. Programs designed to develop accuracy in reading or entering data are understandably the exception to this rule, for they are intended to measure correct procedures.

General Characteristics of Classroom Management Software

The following are characteristics which should be considered when selecting software for classroom management applications. These are provided for the system which does not utilize an interrelated CMI component as a part of the CAI software packages, which, although they can be utilized very effectively to manage educational material for teachers, have generally been used only to manage recordkeeping duties. With some modifications, most of the better DBMS can provide all the CMI characteristics necessary for the classroom:

Documentation (The reader is referred to Unit C.8)

- types available:
 - . . . introduction . . . pull out reference cards
 - . . . reference manual . . . tutorial
 - . . . glossary
- consistent use of terminology
- clear and concise instructions
- clear and easy to understand examples
- well organized and sequential

Output format

- screen and printer or other peripherals used
- report generation is logical and readable
- screen displays are consistent and easy to use
- design of output devices is extensive (make of printer or other peripherals not limited)

Inputs and operation

- procedure for entering data is consistent
- prompts are plentiful and clear
- system commands are logical
- error trapping is sufficient
- error messages are understandable
- restart and recovery is easy and allowed
- sufficient data field length
- flexible data field format
- number of records is adequate (capacity)
- size of records is able to be determined
- speed to access records is adequate
- maintenance of file is acceptable
- variety of input devices supported
- sequencing and logical parameters provided
- windowing is provided (depending on application)
- integration with other data bases provided (dif)

Overall considerations should include the security of data from both loss by operator error and unwanted access by students or others. The installation and ease of operation must be considered if other people are to use the system.

USE OF COMPUTER-BASED INSTRUCTION MANAGEMENT

Control of Instruction

The control of instruction in CBI is no less of a responsibility than in the traditional classroom. In fact, the access to data and results is more pertinent in CBI because more learning can take place at many more levels within a single classroom. Student progress is dependent on the ability of the student and access to machines—not to the teacher. The design and production of control mechanisms can exceed the costs of the instructional material in most CBI systems. Therefore, vocational instructors must carefully assess the merits and costs of any system.

Another fact must be considered when discussing CBI in the vocational classroom. Computer Assisted Learning (CAL) is considered by many to be the proper definition of CAI. To understand the difference, consider this example when you seek help: one person listens and then tells you how the problem can be solved. A second person listens, rephrases the questions you have asked, asks for clarification of meaning, and then extracts additional information from you. During this process, you are guided to a solution. The latter is similar to CAL because students are guided by responses (in this case provided by the software or computer program) and by branching questions and are part of the problem-solving process. Computer Assisted Learning is the preferential type of program for classroom use.

Arrangements must be made very early in the process to provide or develop mechanisms to assess student accountability and progress. If control and recordkeeping systems are not available through the CAI software or CMI adaptations, an alternate method must be established. If these capabilities exist through the software purchased with CAI materials the problem is solved.

Student Records

Three questions must be answered regarding student performance records: a) what information to keep; b) how to keep it; and c) how to report it. Concerns to be addressed include:

- scores on pre- and post tests
- scores on daily lessons
- student responses in class to individual questions
- time spent on lessons (time on task)
- time spent on individual elements
- information of non-assessment mode such as: 1) day of test; 2) student entry and/or exit from program; 3) student's state of completion of program; 4) amount of time taken on any/all elements (lessons needed to complete exercise)

Student Interaction with the Computer

Digital Equipment Corporation markets a Courseware Authoring System (CAS) which permits lessons to be arranged in menu format to control student access to the material. This control allows a student to interact with the material in a sequential manner. The CAS also provides data collection to indicate student usage and the results of activities undertaken by the student. These data are passed directly to the grading and recordkeeping components of the program, which simulate the class books kept by teachers. Another benefit of the program is its report generation capabilities, which can print individual student reports. This system allows recordkeeping to become a useful tool rather than a burden to the teacher.

Other Considerations of CBI

The CAI system chosen should allow the student the opportunity to progress through the lesson without encumbrances or confusion. Screen displays should be consistent so that responses are provided in the same manner. The more reliable the response mode, the more effective the assessment for CMI. Graphic overviews are also of great assistance to students, especially those who have difficulty reading.

Lesson flow is especially important in determining how successful a student has been in completing a task in prescribed time limits. This is accomplished by giving proper attention to concept analysis and the specificity of instructional objectives. Concept maps are useful to the designer of the program and are also helpful to students in the form of branching for determining what steps must be followed to complete a task.

The above items of a CBI program are not management items, but need to be considered when determining what package to choose. Recordkeeping enhancements are management items, but content is not, nor is the lesson flow. However, both of these affect the accuracy of the assessment of student progress. Charts and graphs are extremely useful materials for students, as are tables and workbooks. Whenever a student response is needed, it should be made so that it can be recorded in the computer program. Card readers provide excellent mediums for student response from workbooks or reading assignments, since they can be linked directly to the CMI system.

CLASSROOM MANAGEMENT BY DATA BASED SOFTWARE

Data Base Management Systems

What are data based management systems (DBMS) and how can they be used in the classroom? These are questions currently being asked by educators who have heard about the wondrous ways in which software can produce seemingly endless results for those who are involved in DBMS applications. A data base management system is a software package which can be as simple as a file manager or as complex as an integrated package which not only files, computes, records, and analyzes, but also sorts, prints labels, and provides written reports on preprinted forms.

Anything that can be identified can be handled by a DBMS. The most useful application for educators is to handle grading and classroom assignments. DBMS packages can also assist in the development of lesson plans, create tests, determine course content based on predetermined criteria, determine equipment needs for classes, notify instructors of overdue assignments, track student progress, and serve as a surrogate instructor (temporarily, of course).

Terminology is confusing to first time users of data base systems. The following terms are the most frequently used terms a user will need to know in order to explore the type of package needed for a specific application:

- DBMS An abbreviation for Data Based Management System.
- Field Individual data entry items in a data base. "Name" or "City" are fields.
- Record A group of fields treated as a unit. A mailing address is a record with "Name," "State," etc., as fields.
- File A collection of stored records. A mailing list of past students is a file.
- Indexing The capability to select particular fields to set up fast searches. Generally, only a few fields are indexed to keep the searching simple.
- Sorting The ability of a program to reorder one or more fields in ascending or descending order, such as an alphabetical list or social security numbers.
- Menu A series of items on a screen, much like a menu in a cafe, from which the user can select the action desired. Print, sort, write, and other commands are common menu items.

Some data base systems are user friendly, while others are very difficult to use. User friendly packages provide menus and tutorial help to assist in setting up a program. On-screen helps and menus are especially beneficial to a first time user. The more popular packages are not so user friendly, but compensate by allowing a great deal of flexibility, which makes them more versatile.

There are basically two types of data base packages available for computers: specific purpose and general application. Specific purpose packages are designed for turnkey operation in accounting payroll, inventory, and similar applications. These packages are generally not able to be modified or customized for individual needs or conditions. They are simple to use and can be utilized immediately by a person who is competent in the field, such as an accountant, without much instruction or preparation.

The general application packages are of interest to educators because of the versatility and flexibility they provide. A customized program can be designed to fit almost any classroom need. However, the greater the flexibility, the greater the cost. In comparing different brands of software, the buyer may want the power of dBase II, but the user friendly features of PFS: File or Data Base Manager II. The biggest expense in DBMS is people and time, not purchase cost. User groups can be very helpful to DBMS users because they have solved many of the problems that others will encounter as they establish programs for their needs.

There are two different types of general application data bases: file managers or relational systems. File managers can utilize only one file at a time, while relational data bases can access multiple files at any time. The benefit of a relational data base is that the user can create data which relate to other files and can update those files as the current file is being created. To do this, a common relationship is set up, such as an ID number. File manager can be used effectively for attendance records, progress charts, and grade books, but cannot rely on other files to update individual records. It is of limited use for accounting or calculating activities.

DIAGRAM A

Format					
Records ---	ID No.	First Name	Last Name	Street	City
F i l e	303	Don	Fryer	1931 Baley	Boise
	233	George	Towns	455 Maple	Denver
Fields					

Trade-offs must be made when choosing which package to use. DataEase is a powerful relational data base, but is not simple to use. Data Base Manager II is simple, fast, and easy to use, but it has fewer features than DataEase. dBase II is powerful in all respects, but it is not very user friendly. If you need multiple file access, choose the more powerful package. The more powerful packages also allow full character entry for the use of calculated fields.

PFS: File is a text oriented package which allows a great amount of text to be entered in each file. However, it does not allow calculated fields and needs a companion package to print reports. It would be excellent for lesson plans, information sheets, and student records (without grades).

Some DBMS packages are memory dependent and cannot take advantage of 16 bit processors like the IBM PC and others. They include Appleworks, Three EZ Pieces, and QuickFile. The benefits of these programs, however, are that they are interactive, able to literally customize any screen, and have extremely fast sorts. Their report generation capability is also a plus. However, the file size is dependent on the amount of RAM available and only one file can be sorted at a time.

Another consideration for the user of DBMS packages is the integration of word processing and graphics with the data base. Most data base packages have label generating capability, but not all allow multiple labels to be printed (four-up). A good data base package allows importing as well as exporting of files to provide the benefits of a word processing or a graphics system to be used with it.

Importing files refer to obtaining files from another software file, such as using a Wordstar address file to create a mailing list for a Fast Facts program. The data already stored on a Wordstar file can be electronically transferred to a Fast Facts program so that they do not have to be re-entered. This saves considerable time and effort and allows for the use of existing data files or swapping information. Exporting of files is not supported in some programs, preventing the exchange of data files discussed above. The major reason for this lack of transfer is that coded characters, such as a slash "/", a backslash "\", or a carriage return code, may be missing from the file being exported. Some programs allow only fixed length records to be transferred.

The careful selection of data base programs will prevent undue delays or frustration, and will certainly allow for multiple software programs to be used interchangeably. A caution when selecting software: ask a technician, not a salesperson, about the capabilities of the package. If a salesperson is your only choice, ask for a demonstration of file importing and exporting features.

(Chart A)

COMPARISON CHART FOR SELECTED DATA BASE SOFTWARE (as of 9/14/84)

Features	Apple Works	Data Base Manager II	Fast Facts	PFS File	Data Ease	DBase II	Ultra File
Cost	250	295	195	125	595	500	195
Type	other	file/std	text	text	rel	rel	file/full
Menu	yes	yes	yes	yes	yes	no	yes
Files open	1	1	1	1	all	2	1
Rec/File	var	32m	1500	open	65m	65m	32m
Field/Rec	30	40	5000	3200	255	32	50
Char/Field	78	60	1679	1679	255	254	100
Storage	var	fixed	fixed	var	fixed	fixed	var
File Imp/Exp	both	both	both	exp	both	both	both
Reports	no	no	no	no	yes	yes	no
Password	no	no	no	no	yes	no	no
Sort/Field	no	yes	yes	yes	yes	no	yes
Graphics	no	no	no	no	no	no	yes
Label/Multipl	1	yes	yes	1	1	1	yes

Developing a Computer Managed Instruction Plan

Regardless of the software package chosen or the type of material to be used in the classroom, it is necessary to develop and follow a plan of action. The following items are to be considered as elements in the plan, although additional items may be necessary, depending on the site and the program involved:

1. Establishment of a timeline
2. Organization and evaluation of existing and proposed curriculum
3. Dates of equipment arrival
4. Dates for diagnostic testing and basic student file completion
5. Coding of instructional material
6. Prioritizing of identified subject area, grade levels, classes, etc., to be included in CMI
7. Administrator and principal in-service
8. Teacher and staff in-service
9. Operator in-service and training
10. Completion of class disks and grade disks
11. Cross referencing of instructional material and assignments, tests, equipment, etc.
12. Generation timetable for reports, grades, tests, schedules, etc.
13. Trial run and debugging of system
14. Public relations notices and general information to inform others and community
15. Industry input, content analysis, objectives and competencies identified
16. Backup system available for each component

In-service for all school personnel is critical to the success of the program. The training should focus on the curriculum itself and how the CMI handles the curricular offerings that are to be computer managed. A full time person in charge of a school-wide CMI is desirable if the system is not limited to one program. Some additional questions should be answered before the program is implemented fully:

1. Are the field tested materials distributed, and are the teachers familiar with them?
2. Who is responsible for in-service at all levels?
3. Are principals and others aware of the information available from printouts?
4. Are people who will be using the equipment fully trained in its use?
5. Are students aware of the computer activity and are they prepared to interact as needed?
6. Are parents and the community aware of the program and its potential improvement to the system?

Carefully planned CMI will enhance any educational setting. Plan the work and work the plan, making it a working plan for all involved, especially the students.

SUMMARY

The selection of a data base for a CMI system should not be taken lightly. A plan of action should be prepared which details all the information, timelines, and directions for the individual to follow. Included in the plan should be specific directions for staff development and in-service. The equipment and materials to be utilized should also be included in the plan, along with a tentative schedule for acquisition and installation.

Software selection should be made very carefully. The packages to be considered should be evaluated using a checklist which outlines the characteristics of each. Comparison charts should be developed and matched with the outcomes described in the plan to assure the management of student's records, testing, grading, scoring, and the generation of reports for the individual teacher, student, program, or school.

The difference between a file manager and a relational data base program must be weighed in terms of effectiveness. The selection of a specific purpose package is not as practical as selecting a general purpose package unless the software will be used solely for one type of application, such as accounting and bookkeeping. Some data base software cannot handle the needs of computational tasks. These would not be practical for inventory purposes.

Other items must be considered when choosing a data base system which may require expert assistance from salespeople or technicians. The type of field, either fixed or variable, dictates the limits on the number of records to be set up and can also determine whether or not the files can be transferred or swapped to other software packages.

The cost of the data base selected varies with the capabilities it provides, but there are some powerful packages that are reasonably priced that may suffice in smaller applications. Cost does not dictate quality or usefulness. Most systems are front-end loaded; that is, they require a great amount of setup time. But these systems pay for themselves in the savings of teacher time and effort after they have been implemented.

ACHIEVEMENT INDICATORS

- 1) List eight general steps in the instructional cycle.
- 2) Describe how various steps in the educational cycle can be applicable to computer managed instruction.
- 3) Describe in writing the capabilities needed for hardware to be used in CMI.
- 4) List eight factors associated with software selection for use with CMI.
- 5) Compare two data base management software packages using a characteristics checklist as an evaluative device.
- 6) Describe the elements of student records and other factors to be considered when implementing CMI.
- 7) Select two software packages which could be utilized as a DBMS for a vocational classroom and support your choices by identifying the major advantages of each.
- 8) Prepare a written plan of action for implementing a CMI system in a typical vocational program.

Unit 2

Maintaining Classroom Rosters, Attendance Records, and Inventories

UNIT OBJECTIVE

Upon completion of this unit, the learner will be able to select appropriate management software and design a data base for classroom applications. This knowledge will be demonstrated by making sound judgements regarding the capabilities of various software packages and through completion of the achievement indicators at the end of the unit.

SPECIFIC OBJECTIVES

Upon completion of this unit, the learner will:

- 1) List the factors to consider when selecting management software packages for classroom use.
- 2) Understand the major elements in management software which determine their record handling capabilities.
- 3) Understand the benefits of error trapping and redesign features of data base software.
- 4) Demonstrate the ability to design a data base form using PFS:File or similar file management software.
- 5) Demonstrate the ability to design data base form using dBase II or similar data base management software.

Maintaining Classroom Rosters, Attendance Records, and Inventories

BY: DR. DONALD ESHELBY

Computer Applications for Recordkeeping

The management of classroom or school recordkeeping chores is a natural task for microcomputers. It has been the domain of mainframe and minicomputers for some time. Microcomputer programs are now available; therefore, individual instructors and others are considering their use as time savers from the drudgery of menial records management.

Vocational instructors should consider several points when selecting management software programs. Many good software packages are available from various vendors, but there are also some questionable ones. Excellent locally developed programs are available from users groups as well as other instructors. Vocational teachers should use a checklist to evaluate both the software and classroom needs before making a final choice (See Units B.5 and C.4). What works in one setting may not work in another, depending upon class size, equipment available, and other factors.

The following checklist can be used when selecting software or management packages. It is not complete in all respects, but it does cover the major items:

1. Ease of data entry . . . the system is easy to use without difficult set up or programming.
2. Error trapping feature . . . mistyping or nonsense data are detected by the program and prompts made to prevent large amounts of incorrect data entry.
3. Memory required and hard disk options . . . minimum memory is generally 48K with two drives. Large schools may need hard disk capability to store 1200 or more records for central office use.
4. Other equipment capability . . . a card reader or light pen and similar labor saving devices should be supported.
5. Speed of processing . . . the type of programming language used and the type of disk or memory system used to determine how efficiently data are handled.
6. Price . . . purchase of software is only one expense. Equipment needs are other costs, as are time and effort.
7. Multipurpose . . . integrated packages and software which support file importing and exporting allow extended use of the package. Scheduling, grading, and attendance rosters are points to consider.
8. Record capacity . . . most systems allow only 400 or so student records to be kept on a single disk. The rule of thumb is not to have more than two or three master disks.
9. Redesigning format . . . most programs allow a user to change the design of the forms without loss of data, but some do not. This feature saves many hours of data entry time.
10. Other . . . documentation and dealer support are important items, as is a proven product, one which has been around and has been field tested in schools.

Program Applications and Limitations

In a vocational program with 25 students and 180 learning tasks to be performed during the year, careful consideration must be given to selecting a package which will handle all the student records. Generally, student records are not a concern. The concern is usually over report generation and the number of fields handled by the program. The size of each field also dictates the usefulness of the application. If a printer will not support 132 columns of data, an incomplete report will result. Most programs will not provide a large printout unless they are spreadsheets.

In addition, if the records per file are limited and/or field length or number of fields is small, the program is not applicable to programs with large numbers of competencies to be learned. It is not unusual to have more than 80 tasks per grading period or a progress chart with over 80 tasks listed. A program like Apple File III will handle these specifications because it can process 30,000 records per file, 80 fields per record, and 255 characters per field. The problem lies in the fact that it is available only for the Apple III computer which is not popular. You also need 256 K and a hard disk drive.

Other Possibilities

The new Appleworks may be the answer to the problem, as might be Data Ease, with 255 fields per record and 255 characters per field. Data Base Manager II would not work because of its limitation to only 40 fields per record. Other applicable programs include Lotus 123, Multiplan, VisiFile (IBM version—not Apple), and Fast Facts. PFS:File may work, but the space may be limited if many students are enrolled. Some of these programs are spreadsheets, not full data base managers and, therefore, may have limitations managing data. However, they are excellent for report generation and progress chart use or attendance records.

Some of the limitations within smaller data base programs can be programmed around by putting data on more than one line or field. Codes can be used to signify grades, completions, and other items. A "+" or "-" can be used along with A\$B\$C\$ grades, or "X" and "O" for completion of tasks. These limit the detail of the report

unless there are provisions to interpret the codes within the report generation features of the program. Another possibility is to break the file into more than one grading period with fewer tasks performed in each. More reports will be prepared during the year and a complete overview is not readily available, but it may fit instructional needs better.

To make use of spreadsheets in creating progress charts with many vocational instructional tasks, it may be advisable to set them up vertically rather than in the conventional horizontal format. This can be done by using a utility program called "Sideways." This package takes normal spreadsheets, or other printouts, and prints them sideways rather than in the regular manner, allowing instructors to print as many columns as needed because it prints the information lengthwise on the paper. The only limitation is the number of rows the spreadsheet can handle. It is more effective with roll paper than with tear sheet style, but that is a matter of personal choice. The program is compatible with popular spreadsheet packages such as Visicalc, Multiplan, Lotus 123, and others.

Help is available for learning how to use data base software packages. Cdex Tutorials are very helpful when learning how to master the complexities of programs such as dBase II or Multiplan. These are disk oriented materials which lead users through each step of the set up and use of the software. Videotape versions are also available from other vendors for learning how to use various programs.

An extremely valuable feature to all data base users is the reformat option. Unless the instructor is a proficient programmer, or is lucky, he or she will need to redesign the form used to enter data at some point in time. Unless the design can be changed without losing data or taking a lot of time, instructors might want to consider selecting another package. Most packages allow changes.

Attendance and Scheduling Systems

Another application for classroom management is attendance records. There are several software applications for handling attendance. These packages can save many hours of the instructor's or administrator's time. Most of these packages provide period by period reporting; some check for cuts by students; and most include the use of a card reader as an option. The card reader itself can save valuable time by reading as many as 60 student records per minute. The use of a hard disk drive eliminates the need for disk swapping and increases the storage capacity of any program.

A few programs which provide attendance recordkeeping include: Attendance Reporting System (ARS), Attendance Tracking System (ATS), and Attendance and Scheduling Program (AASP). The Attendance Reporting System handles 750 records on one disk, while the Attendance Tracking System handles 4,000 records on three disks. Both of these programs have card readers and hard disk drive options. The Attendance and Scheduling Program does not support a hard disk at this time, but it handles 800 records per disk with a total capacity of 2,400 records. It also can schedule 250 students and supports 16 course selections per student. The scheduling features are not generally a consideration for classroom instructors, but the use of such a package would enhance the overall use of classroom management by the district or area school.

Anyone interested in selecting a management software package should garner as much technical information as possible about the program. This should be done to ensure that a wise choice will be made. Spending time and effort to make a not-so-good program work is ineffective. There are several sources to use to more fully understand the working of software packages and their various features, including magazines, journals, technical manuals, some electronic data bases, and books. One recent publication, *The Ratings Book*, provides an in-depth evaluation of software for the IBM PC, and similar publications are available for other makes of computers. This particular book uses eight points on a comparison chart to make evaluations:

1. Ease of Set Up
2. Ease of Learning
3. Ease of Use
4. Error Handling
5. Performance
6. Versatility
7. Overall Evaluation
8. Value for the Money

The publisher provides a similar book for spreadsheets and other application packages. A general rule for vocational teachers to follow is to find out as much as they can beforehand rather than try to learn the system after

it has been purchased. Instructors should obtain a system to fit their needs, rather than try to fit their systems to the software. Teachers should take a sample of their existing file material with them to the supplier and try it out before they buy. If instructors are using software now, they should make certain that it is compatible with the management system software so that data will not have to be re-entered extensively.

EXAMPLE OF SETTING UP A DATA BASE USING PFS:FILE

(Information adapted from Software
Publishing Corporation material)

Set Up Procedures

To initiate the PFS:File package, it is assumed that the computer has been booted and PFS:File is in the A drive with a formatted data disk in the B drive. Type "File" to load the software program into the computer memory. When the program is loaded, a screen similar to the one below is displayed. (Example is for IBM)

Chart 1

PFS:File Function Menu

- | | |
|-----------------|-----------------|
| 1 Design File | 5 Print |
| 2 Add | 6 Remove |
| 3 Copy | 7 Exit PFS:File |
| 4 Search/Update | |

SELECTION NUMBER: _____

FILE NAME: _____

(c) 1983 Software Publishing Corporation

F10-continue

Designing the file is a simple process that is explained well in the documentation manual. The process is as follows: Type "1" to choose the item to design a file and type the FILENAME you desire. Because this example will be used to prepare a file for student biographical data, use STUREC. Type "B:STUREC" because the data disk is in drive B. When this is completed, press F10 as prompted on the menu to continue.

The program prompts you to choose either to CREATE A FILE (1) or to CHANGE A DESIGN (2). We need to create a new file since we have none in the program as yet. Type "1" and press F10 to continue. A few items near the bottom of the screen appear, which are what we will use to design our file. The file name STUREC is shown at the bottom, along with the date, time, and page number. A prompt to indicate that we are in the design mode also appears. Since PFS:File does not have any field length limitations, we could enter text data in sentence format without any problem.

The design is created by moving the cursor to a point on the screen where you want the field to be. The position of the next field will determine the size of the first field. It is best to leave at least one extra space in each field for the retrieve features of the program. We will need fourteen fields for our record file. The screen will look like the example below when we have completed our design:

Chart 2

Name:	Sex:	Age:
Program:	S/S No.:	
Enroll:	Class Hours Compl:	
Withdrawal:	COOP Hours Compl:	
Completion:		
Health/Cond:		
Parent/Guard:	Phone:	
Employment:		

This same screen will appear each time you want to enter data or retrieve records. The fields are used to identify which record you wish to update, delete, or select to print from. The step just completed only created the design. We need to enter the data from each student record onto the screen as it appears when the F10 key is

pressed. To enter data, we must go to the Main Menu and select item 2 or the "ADD" option shown. The blank form created (Chart 2) will now appear and we can enter each item as we have it available. Exit dates and employment data are entered as the student progresses through the program. To do this, we select the "SEARCH/UPDATE" option and type the retrieval data as prompted.

When all students' records have been entered (Chart 4), we can print out any number of reports, depending on the manner in which we set up the print function. The retrieval screen is used for all data input or report selections. In the example below, we are going to print a list of names of females who completed the program on May 30, 1982, so that we can conduct a sex equity follow-up survey. If we had addresses, we could also print mailing labels.

To begin, press the "ESC" key to return to the Main Menu. Select option "5" to set up the print function. A blank retrieval form with all the fields created is shown. Place an "F" in the field for Sex, and in the field for data of Completion, enter 82/05/30 (See Chart 3, entering 82 would retrieve all female students who completed the program in 1982, not only those who completed in May).

Chart 3

Name:	Sex: F	Age:
Program:	S/S No.:	
Enroll:	Class Hours Compl:	
Withdrawal:	COOP Hours Compl:	
Completion: 82/05/30		

Examples of student records would appear as follows:

Chart 4

Name: JONES GORDON	Sex: M	Age: 18
Program: MACHINE SHOP II	S/S No.: 555-66-4444	
Enroll: 79/09/03	Class Hours Compl: 720	
Withdrawal:	COOP Hours Compl: 600	
Completion: 82/05/30		
Health/Cond: ALLERGIC TO PENICILLIN		
Parent/Guard: JONES NANCY	Phone: 234-5567	
Employment: BREWSTER MACHINE WORKS	82/06/12	
ACME MACHINING	84/01/1	
Name: GEORGE SHELLY	Sex: F	Age: 19
Program: MACHINE SHOP II	S/S No.: 445-66-5546	
Enroll: 79/09/03	Class Hours Compl: 480	
Withdrawal:	COOP Hours Compl: 750	
Completion: 82/05/30		
Health/Cond: EXCELLENT, POLLEN DUST ALLERGY		
Parent/Guard: GEORGE MATTHEW	Phone: 234-6778	
GEORGE SUSAN		
Employment: ACME MACHINING	82/09/25	
Name: PRATT DAWN	Sex: F	Age: 18
Program: MACHINE SHOP II	S/S No.: 445-44-9834	
Enroll: 80/02/10	Class Hours Compl: 450	
Withdrawal:	COOP Hours Compl: 500	
Completion: 82/05/30		
Health/Cond: EXCELLENT		
Parent/Guard: PRATT MICHAEL	Phone: 234-9812	
PRATT DIANE		
Employment: JOHNSON PAPER WORKS	83/09/08	

To print the list, we need to determine what information would be useful to the survey people. The fields; name, program, class hours, coop hours, and employment are chosen. The F10 key is pressed to take us from retrieval to printer set-up. The menu options show the following choices. We will enter the appropriate information to set our printer specifications as shown below:

Print Item Names (y/n) Y
 Print to: LPT1
 Lines per page: 11
 Number of copies: 1

These specifications will print the item names on a line printer with 6 sets of names per printer page. There are 66 lines of print on a regular 11 inch sheet of paper so we can print 6 items of 11 lines each on one page. To determine the format, we need to set up print specifications. Again, the retrieval screen is used to set up the print specifications and "Xs" are placed in the fields to indicate whether or not the item is to be printed. Since we selected name, program, class hours, and employment as our items, the screen would look like this:

Chart 5

Name: SX	Sex:	Age:
Program: X	S/S No.:	
Enroll:	Class Hours Compl: X	
Withdrawal:	COOP Hours Compl: X	
Completion:		
Health/Cond:		
Parent/Guard:	Phone:	
Employment: X		

We did not need the date of completion printed because the survey team determined this for us. It is part of the study information. One other feature used in this example was a "SORT" function. We sorted the information by name of student and, since the names are entered by last name first, they will be printed alphabetically. This was accomplished by typing an "S" before the "X" in the name field.

If we had entered given names first, the report would have been printed alphabetically by first name, e.g., Jan, Jane, Jill, Joan. Sorting is easier when surnames are entered first, but a sort can be accomplished in any manner, using any field. For example, a normal sort for bulk mailings is generally done on a zip code field.

When using a file manager or data base manager, the most commonly needed field should be the first field in your form. This is not true of all programs, but PFS:File and others key on the first field as the primary retrieval or sort field. It is generally the first "marker" that is checked by the program. When entering people data, we usually search by last name, by social security number, or other number or code which identifies that person from all others. In our example, the surname was used.

A search can be accomplished by using the exact name that is in the file. We must know what that exact name is or else we will have to use a trial and error process until we come to the right combination. There is less of a problem if we search on last name, even if there is more than one person with the same last name, such as Smith. The program will ring up every Smith until you determine which one you need. This is much simpler than trying to locate Joan Smith, Joanne Smith, or Jo Ann Smith.

The report printed for the survey team would look like this:

Chart 6

Name: GEORGE SHELLY	
Program: MACHINE SHOP II	
Class Hours Compl: 480	
COOP Hours Compl: 750	
Employment: ACME MACHINING	82/09/25
Name: PRATT DAWN	
Program: MACHINE SHOP II	
Class Hours Compl: 450	
COOP Hours Compl: 500	
Employment: JOHNSON PAPER WORKS	83/09/08

EXAMPLES OF SETTING UP A COST/PRICING BASE USING dBASE II SETUP PROCEDURES (Example modified from Ashton-Tate)

To initiate the program it is assumed that all equipment and software are properly set up and adjusted. Once the computer has been booted, type DBASE and press the return or entry key. This puts the program into computer memory or allows you to start entering the format you desire. Some computer programs require that a disk with the program on it remain in the computer because several special routines must be called on to perform certain actions.

For our purposes, leave the dBase II disk in the computer and insert a formatted or initialized disk in the second drive. This will become your working or data disk. All the files created for the applications you desire will reside on a working disk. This disk will be empty or will not have any space taken up by a program, enabling you to store more data files on the disk.

To begin working with dBase II, type the command "create." This tells the program that you are going to prepage a data base. The program asks you for a file name which you type in. This is generally a descriptive name for your data base. We will use INVDON to indicate that it is an inventory file for Don. After you have given your file a name, the computer prompts you for additional information about the fields in your record. This procedure describes each field needed to enter data for the data base.

dBase II requires that you enter a field name and specify whether the data for that field are numeric or alph/character. A "C" is used to denote character data and an "N" denotes numeric or decimal places, if needed. A return or entry keystroke is needed after each field is entered. We will use Item, Type, Qnty, Cost, and Extn as the fields. The responses will appear as follows:

Chart 7

```

CREATE
Filename?  INVDON          (our file is named INVDON)
Field      name, type, width, decimal places
001      Item, C,20        (we have left 20 character spaces for describing the Items)
002      Item, C,6         (we have left 6 character spaces for describing the Types)
003      Qnty, N,3         (we needed 3 numbers for listing the Quantity used)
004      Cost, N,6,2       (the cost of the stock is up to the thousand figure with two decimals)
005      Extn, N,7,2       (this will be the total of the stock items as computed by the program,
                          There are seven digits with two decimals)
006      RETURN           (keying the return or enter will complete setting up the data base. We are
                          now ready to enter the data)
  
```

Entering Data in dBase II

The screen will appear as follows with the empty spaces shown as you set them up in field lengths:

Chart 8

```

Record No.: 0001
Item          : _____ (20 spaces)
Type          : _____ (6 spaces)
Qnty          : _____ (3 spaces)
Cost          : _____ (6 spaces)
Extn          : _____ (7 spaces)
  
```

We need to input or enter all the data into the file at this point. The screen shows you the form which has been created to enter the records of what has been bought or sold. For school inventory purposes, the same process must take place. If a student is repairing an automobile in an autobody program, all the parts, supplies, and other items used must be accounted for by some system. The computer manages data extremely well. This listing will suffice as an example, but more detailed information would be used in practice. No entry will be made for the Extension field because this data will be computed by the program after we set up the reporting format (see chart 8).

Chart 9

Examples of data entered on forms:

Item : R Front Fender

Type : used

Qty : 1

Cost : .35

Record No. 0002

Item : Midg clip

Type : new

Qty : 12

Cost : .35

Extn : .35

: ALL THE INFORMATION
IS ENTERED INTO RECORDS
WHICH ARE NUMBERED
CONSECUTIVELY.

Setting Up and Printing the Report

dBase II will generate the following queries to which we respond, as shown by capitalizations, followed by a return or enter keystroke:

Chart 10

REPORT

Enter report form name: INVDON

Enter options: M—left margin, L—lines/page, W—page width

RETURN (we are going to use default set up format)

Page heading? (y/n) Y

Heading: PETER PIPER'S T-BIRD (Peter's autobody project)

Double space report? (y/n) N

Are totals required? (y/n) Y (only numeric fields are prompted for totals)

Subtotals in report? (y/n) Y

Enter subtotals field: EXTN

Summary report only? (y/n) N

Eject page after subtotals? (y/n) N

Enter subtotal heading: EXTN

Most of the set up has been completed. We will use the subtotals as totals on our report, which is why we had to respond with a "Y" to both queries. The program is now able to prepare for the report generation process. We need to set that process up in much the same manner as the report format. The program will provide prompts as before and we will provide field lengths and names as spacing information. We will also set up the computation formula for the Extension item. The program prompts continue without commands from the user at this point. dBase II will set up the report generation procedure as follows:

Chart 11

Col Widths, Contents

001 20, ITEM

Enter Heading: ITEM

002 6, TYPE

Enter Heading: TYPE

003 3, Qnty

Enter Heading: QNTY

Are Totals Required: (y/n) Y (numeric fields prompted for totals)

004 7, COST (we use seven because of quantity factor)

Enter Heading: COST

Are Totals Required: (y/n) Y

005 7, COST*QNTY (this is the computation formula: cost times the number of items used)

Enter Heading: EXTN

Are Totals Required: (y/n) Y

006 RETURN (this completes the set up of the report and generation format)

We next need to have the report displayed on the screen so that we can determine whether or not it is complete and accurate. To do this, the command "Report" is used by dBase II. A prompt as follows is given:

Name of Report: INV DON (this is the name we gave it when we set up the format)

The report will be displayed on the screen as we had set it up. If we want to obtain a printed or paper (hardcopy) copy of the report, it can be provided using the printer attached to the computer. dBase II uses the command "Report to Print" for making paper copies on a printer. You will be prompted for Report Name. Type in INV DON and the report will look something like the following:

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Chart 12

PETER PIPER'S T-BIRD

Item	Type	Qty	Cost	Extn
R Front Fender	used	1	130.00	130.00
R Fender Lip Mldg	new	1	11.00	11.50
Turn Indictr Lght	used	1	9.00	9.00
Mldg Clip	new	12	.35	4.20
Lens	new	1	3.50	3.50
Shop Material	unit	6	5.25	31.50
Primer	qt.	1	6.80	6.80
Paint	qt.	1	9.85	9.85
Subtotal		24	172.75	206.35
Total		24	172.75	206.35

Some changes in the design would result in clearer information. The example was designed only to show the capabilities of a data base system within a vocational program. The limitations of the set up are only those imposed by the capabilities of the program. We could have, for example, determined the costs of items in terms of percentages such as one half a quart of primer. To do this, we would create a formula as we did for the Extension field. We would have had to set larger field sizes for the items we wanted changed.

When determining what system would work best for your program needs, there are some suggestions to consider. Keep the following thoughts on paper to ask salespeople when shopping for a software package:

1. Spend considerable time testing different software packages and ask for demonstrations from different vendors.
2. Be wary of promises that a data base "will be able to do those functions next month with an update." Assume that if it can't perform for you now, it never will.
3. Determine if the files created by the data base will be compatible with other packages you use or propose to use. If you have a word processing or spreadsheet package, you should take some files with you or try the new package out for yourself. A class list on Wordstar should be able to be used on Datastar because they are produced by the same company, but others may not work with your Wordstar software.
4. If you have many files with large quantities of records in each, you may need a Database Management System rather than a File Manager. Try different types to be sure.
5. Remember that with some relational data bases, such as dBase II, it may be necessary to learn how to write programs using the "queing" or "query" languages they provide.
6. Determine if the programs have error protection features. These may be referred to as error trapping devices which prevent you from making costly time consuming errors when entering data without saving it.
7. Consider programs which allow redesign or other changes without data loss.
8. Until the new system is perfected, continue to use the old one as backup.

SUMMARY

The intent of this unit was to provide readers with an overview of microcomputer applications for maintaining classroom rosters, attendance records, and inventories. Several considerations were presented for selecting software for classroom management purposes. This unit provides examples of software packages which have attendance recordkeeping applications. The concluding segment of the unit provided an example of setting up a data base.

ACHIEVEMENT INDICATORS

- 1) List the factors to consider when selecting management software packages for classroom use.
- 2) Describe the major elements of two classroom management software packages which determine their capacity, speed, and functions.
- 3) Explain the benefits of error trapping and design change features when selecting management software.
- 4) Design a data base form using a file management software package such as PFS:File.
- 5) Design a data base form using a data base management software package such as dBase II.

SOFTWARE REFERENCE GUIDE

APPLE FILE III	Apple Computer Incorporated, 20525 Mariani Avenue, Cupertino, CA 95014
APPLEWORKS	Apple Computer Incorporated, 20525 Mariani Avenue, Cupertino, CA 95014
ATTENDANCE AND SCHEDULING PROGRAM	Charles Mann & Associates, 7594 San Remo Trail, Yucca Valley, CA 92284
ATTENDANCE REPORTING SYSTEM	ESM Box 12599, Research Triangle Park, NC 27709
ATTENDANCE TRACKING SYSTEM	Edu-Camp Incorporated, 14109 S.E. 168th Street, Renton, WA 98005
Cdex TUTORIALS	Cdex Corporation, 5050 El Camino Real, Suite 200, Los Altos, CA 94022
DATA BASE	Alpha Software Corporation, 12 N.E. Executive Park, Burlington, MA 01803
DATA EASE	Software Solutions Incorporated, 305 Bie Drive, Milford, CT 06460
DATA STAR	Micro Pro International Corporation, 33 San Pablo Ave., San Rafael, CA 94903
dBASE II	Ashton-Tate, 10150 West Jefferson Boulevard, Culver City, CA 90230
FAST FACTS	Innovative Software, 9300 West 100th Street, Overland Park, KS 66210
LOTUS 123	Lotus Development Corporation, 161 First Street, Cambridge, MA 02142
MULTIPLAN	Microsoft Corporation, 10700 Northup Way, Bellvue, WA 98004
PFS:FILE	Software Publishing Company, 1901 Landings Drive, Mountain View, CA 94043
SIDEWAYS	Funk Software, P.O. Box 1290, Cambridge, MA 02238
THE RATINGS BOOK	Software Digest Incorporated, One Wynnewood Road, Wynnewood, PA 19096
VISIFILE	Visicorp, 2895 Zanker Road, San Jose, CA 95134
WORDSTAR	Micro Pro International Corporation, 33 San Pablo Avenue, San Rafael, CA 94903

Unit 3

Generating Tests, Scoring Tests, and Recording Grades or Performance Progress

UNIT OBJECTIVE

Upon completion of this unit, the learner will be able to determine what applications of testing can be provided through a computer-based program and will be able to describe the features of various software programs available for classroom use. This knowledge will be demonstrated by the successful selection of a testing program applicable to the specific program needs of the learner and through completion of the achievement indicators at the end of the unit.

SPECIFIC OBJECTIVES

Upon completion of this unit, the learner will be able to:

- 1) List the reasons for the popularity of computer-based testing programs.
- 2) Distinguish between a test creation program and a computerized testing program.
- 3) Discuss the points to be considered prior to utilizing computer-based testing in a vocational program.
- 4) List items to consider when comparing the use of a gradebook system to a computer-based system.
- 5) Prepare a list of questions to ask when selecting a computer-based testing program.
- 6) Distinguish between an Authoring Language and an Authoring System.
- 7) Identify the three major types of Authoring Systems.
- 8) Compare the advantages and limitations of current versions of Authoring Systems and give examples of their use in vocational programs.

Generating Tests, Scoring Tests, and Recording Grades or Performance Progress

BY: DR. DONALD ESHELBY

The use of computers in vocational classrooms is becoming more popular with the advent of less costly equipment and software. Another reason for this popularity is the increased awareness of the usefulness and effectiveness of computers in managing mundane chores such as test creation, re-creation, scoring, and grading. Many testing programs have been written by both local teachers and commercial producers of software. The level of their sophistication varies with the writer and the application, so does the cost.

The application of the computer program must be consistent with the needs and nature of the classroom and instructor. Basic rules for test construction should not change. A good test on paper, properly constructed, following the rules of psychometric procedures, can be far more useful than a poorly developed computerized test regardless of how much easier it is to administer and score with the computer.

Tests must be matched with the objectives of the course. Criterion Referenced Tests are common in vocational programs. The criterion for each test item is the objective. A computer can match test items with objectives very easily. Many test items can be prepared for each objective or competency being taught in the class. These test items can be banked for access at any time. Test items can be printed on paper for duplication, or they may be incorporated into the material presented in computer programs. This is a major reason for vocational instructors to consider computerized testing.

However, test items do not have to be on the computer or reside in the program in order for instructors to utilize computerized testing. Test items can be provided orally or on paper; students can respond by using a keyboard or marksense cards. A cardreader can then read and score test results for instructors. It would be simpler to have students respond to marksense cards than to have the answers sent to the scoring process through a computer. The logical method would be to have questions and responses incorporated into the computer program.

Test creation using a computer is not an easy chore. The tests must be prepared in the same manner as typing the questions for paper use. The major saving factor occurs after items are entered into the program. The average size question requires approximately 350 bytes of disk storage space. A byte is usually stored in computers as eight bits of information, which are the equivalent of one character, letter, number, or symbol. There are approximately 160,000 bytes of space on a single sided disk or room for approximately 460 questions. The amount will vary for each program, depending on how it handles data. The capacity of a program determines how much material can be stored on a disk. Most programs describe the type and number of items which can be placed in data files.

Most commercial test software follow the accepted procedures for test preparation. Testing programs generally allow one to enter specific test items; therefore, the user determines the effectiveness of the testing program. The producer of the program can only make certain that data are managed within the program to give accurate totals, averages, means, and other statistical inferences. The following list contains points for instructors when they consider using computerized testing in their vocational programs:

1. Online tests are preferred but are not absolutely necessary, especially if valid and reliable tests are available. It is wise to enter these tests as a regular part of the computer managed instructional process as a method to save time and effort at a later date.
2. Tests should be designated using accepted psychometric principles.
3. Pre-tests, if used, should be designed for a specific purpose, such as to diagnose specific problems or to allow students to test out of a component of the course. In most cases, objectives can be used for pre-tests.
4. Readability and reading level of tests must be consistent with students' abilities.
5. Content integrity (accuracy of technical content), spelling, and grammatical presentation must be correctly maintained.
6. Methods of presentation must be clear. The display should be informative, interesting, and not distracting.
7. Aesthetic quality of material should be practical. The use of color, reversed print, and other features of the screen can provide extra interest and maintain the attention of the student.
8. Observation of students while they are taking tests can be beneficial to determine what specific problems exist in the manner of presentation, errors, ability to interpret questions, and other elements of the testing process.

Many instructors use a card file of questions which can be sorted and used to develop new tests. This is a type of test bank, but the teacher must have each question retyped in order to develop a test on paper to hand out to students on test day. In a computer, these items can be stored in text files. Even an unsophisticated program can read the items from the file and print copies of the test to be distributed to students. The computer can be used to scramble the order of items each time so that many versions of the same test can be made. Once the items are on file, others can be added to create an item bank. Even the simplest of systems eliminates the need to retype test forms.

Many software programs have been developed by local and commercial sources. It would not be practical to review these materials specifically, but a general description of the features in some programs may benefit the teacher who is looking for a program to assist with the testing phase of teaching in a vocational program. Generally, the test programs allow the user to use true/false, multiple choice, short answer, and essay questions. Additionally, most provide test keys as well as a feature to print different versions of the test. Some will allow randomized tests to be generated using a bank of items for each topic. Some programs can be used by students to directly enter their answers using the computer.

The more complex programs score the tests and provide individual printouts of the student responses by question. The use of histograms and other graphic displays is common. These can be helpful for students to determine how they are progressing in relation to the other students in the class.

A determining factor for instructors to consider when deciding whether or not to use computerized testing is "What can the computer do that you cannot do or are not doing by hand using your gradebook?" The need for a computer-based testing (CBT) program can be determined by using the following list as a guide:

1. What kind of data is kept?
2. Do you use letter grades or numbers?
3. How do you handle missed assignments/tests?
4. How do you determine final grades?
5. Do you use average/percentages/totals?
6. Do you use weighting of scores?
7. Do you keep data/notes for each student?
8. Do you use subjective rating; how determined?

The most effective way to determine student grades is to consider all the elements listed above. Most of these are time consuming and would be difficult to record properly in a gradebook. Some require a great amount of computational effort. The typical teacher does not have enough free time to utilize all of the most desirable grading procedures; therefore, most teachers compromise and use the basic elements of simple grades and overall scores.

The use of a testing program on a computer provides a great amount of flexibility in the manner in which grades are assigned to students. The use of progress charts is widespread in Trade and Industry programs. These charts take considerable time to maintain, but are useful when assessing a student's relative progress in class. This process is tailor-made for computerization. Recent shifts toward competency-based instruction also create an atmosphere in which computers can be used effectively. The specificity of this competency approach to instruction necessitates computerization to do an effective job of assessing individual student progress. This is not to say that competency-based education cannot be provided without computer-based testing. Any recordkeeping process will work, but it is more effective and easier on a computer.

With the number of software programs available for instructors to use, it is difficult to determine which is the best program. There is no simple method to choosing a computer testing program, but guidelines are available. The following set of suggestions can be used in an initial selection process. Since software is available from independent users as well as commercial vendors, it is easy to review the best program without either buying or paying a fee which is applied to the purchase price. It is always wise to review every software program you intend to use, regardless of its source. Users groups are a good source of reliable information on the effectiveness and use of software. Units B.5 and C.4 provide readers with information pertinent to software selection. Instructors should examine computer-based testing software with a special focus on these concerns:

1. Capacity; ability to store data
2. Ease of data entry
3. Ability to obtain totals/statistics without re-entering grades
4. Error checking provided; 100 entered as 1000
5. Coding system; names or IDs
6. Ability to add individual scores
7. Ability to combine classes for analysis
8. Type of reports available
9. Availability of histograms and similar comparison charts

There is a difference between a simple test-generating program and a grading program. Most test-generation programs don't provide scoring features. This is especially true if they are obtained from local development sources. The benefit of the simpler programs comes from their ability to produce tests very easily and from the fact that they are not expensive. Card reader scoring, when used with these programs, can provide many of the benefits of a more expensive system. Some of the simpler programs do not store the tests after they have been generated from the data bank, which prevents using that test for future classes. The descriptions of a few test programs are provided below as points of comparison among various features of testing programs:

TEST MAKER

(Karl Jahns)

1. Randomization of items to create different for-s of the test
2. Test can be stored by name on the disk for later use
3. Answer key for each form
4. Choice of print format
5. Five types of questions
6. Up to 125 questions per test
7. Up to 6 lines per question
8. Requires lower case (Apple II)
9. Editing or updating of items
10. Duplicate tests in random or same order
11. Printer control & paging opt.
12. Menu-driven
13. Apple only

GRADE MANAGEMENT

(Karl Jahns)

1. 40 grades for 40 students for up to 30 classes
2. Weighted grades
3. Grades can be letter, number, percent, raw scores, or weighted
4. Reports generated for
 - a. individual
 - b. alphabetical by student
 - c. total all classes
 - d. missing assignments
 - e. continuous by individual
 - f. scores for any assignment
5. Statistics are given for:
 - a. frequency distribution
 - b. class average
 - c. standard deviation
 - d. cumulative averages for each student or by class
 - e. student ranking
 - f. class average histogram with mean and standard deviation
6. Descriptions of assignments
7. User definition of grade ranges
8. Apple II or IIE

TEST COMPOSER

(Vernon Johnson)

1. Items stored for future use
2. Items coded for type, class, difficulty level, & objectives
3. Five types of questions
4. Answer key for each test
5. Editing utility for item revision/updating
6. Test items can be selected by item number
7. User can enter parameters to choose items by types, level class, difficulty
8. Tests are composed using the choices selected in 6 & 7
9. Tests are composed from test bank. Can be added to easily
10. Menu-driven
11. IBM, PC, & TRS-80

GRADE KEEPER

(Norman Hardy)

1. 33 students per class
2. 27 sets of scores per student
3. Weighting of scores
4. Semester averaging
5. Ranking of scores
6. Computes mean, mode, median, and standard deviation
7. Scales scores to desired range
8. Graphs distribution
9. Easy to change options to edit scores on screen
10. Scores can be stored on tape or disk for permanent record
11. Scores and other information can be entered from keyboard
12. Clear prompts and directions
13. TRS-80 only

GRADE KEEPER 3.0

1. Enhanced version of the Grade Keeper
2. Utilizes features of IBM-PC
3. 30 scores for each of 36 students in 8 different classes

Another instructional management software package titled "Generalized Instructional Management System," written for the TRS-80 computer, will maintain the same basic type of records described above for 600

students on 300 individual student objectives. This would be the equivalent of 40 students for 15 teachers. There is a pre-test and a post-test for each objective, plus a communications component which describes the mastery of each objective for the student, parent, or teacher. Another feature provides the listing of 255 references that can be keyed to objectives. The system can collect test data on 30 students per hour with the student typing the answers on a keyboard.

The "Classroom Manager" provides both a class roster program and a classroom testing program in one package. This testing program will allow four types of questions: T/F, multiple choice, essay, and fill in the blank. There is a provision for headings and/or instruction for each test section and a powerful test indicator allows the user to change or modify any part of the test. Test sections can be randomized, tests can be administered using computers or printouts, and item analysis is available for computer administered tests. Feedback is provided on testing done on the computer. All questions can be printed out for review and can be printed out randomly, sequentially, by manual selection, or with an answer key. The package is available for Apple Plus or Apple IIe computers.

Authoring Languages

The use of computerized testing and computerized instructional materials depends on the ability of some person(s) to prepare useable and valid software. However, many simple test programs are written using Basic Language so they can be modified by the classroom novice without much difficulty. These programs are generally limited in their ability to handle complicated sets of data because the program needed to generate the desired results would be too large to fit on a disk. There would be no room for data or the results would be too slow and clumsy to handle effectively.

A commonly used approach to develop instructional software is through the use of an authoring language (readers should refer to Unit B.4 for additional information regarding authoring languages). Commercial program developers rely on authoring languages or authoring systems to simplify the tasks of development. An authoring system is a program or a set of programs which allow the instructor to create computer-based materials without the need to learn complex programming languages. The logic of procedure is built into the system; all the instructor needs to do is to provide the instructional content and method to be applied. The programming code is automatically generated specifically for those instructors.

It is important to differentiate between an AUTHOR LANGUAGE and an AUTHORIZING SYSTEM. Special purpose application languages such as TUTOR or COURSEWRITER facilitate the writing of instructional programs that are used in CBI. An author must learn the language to effectively utilize the process. An AUTHORIZING SYSTEM is an interface which is used by authors to develop courseware without having to learn the language; someone else has programmed the instructions using an authoring language. Nonprogrammers can use an authoring system effectively to create a computer-based curriculum, including testing applications which are built into the program for immediate response to learning situations and feedback rewards.

Three major factors have given rise to the development of authoring languages and systems:

1. Ease of use and access to computers in the classroom,
2. Considerable expense and time required to create CBI, and
3. Transportability of courseware.

Computers are commonplace in today's classrooms and laboratories. This rise in popularity is leading to an increase in demand for computer interaction by students and the need for courseware. Computer-based instructional material is defined as courseware by most users of computer-assisted learning packages. It is estimated to take from 50 to 200 hours to develop a single computer-based instructional packet of one hour in length. Instructors do not have much time to devote to such an activity. For this reason, sharing of courseware is readily accepted by all users. This transportability of courseware makes the development of the material very attractive to commercial vendors.

Three major types of authoring systems have been developed: macro-based, form-driven, and prompting. The macro-based system provides the user with a number of high level verb commands which can be used to process answers, present text, or provide branching direction. The need to define screen clearing or coordinates is eliminated, as are many other detailed commands.

The form-driven system provides offline or online forms which describe the needed information to create a lesson or course. The author follows the instructions provided to set up both the questions and the conditions for learning the material. IBM's Interactive Training System is an example of a form-driven system, as are some of the PLATO materials.

Prompting systems use an interaction between the system and the author to develop courses. Responses by the author are used to generate the program. These systems can be used to meet specific curricular needs such as medical applications where specific problems can be simulated to create symptom, diagnosis, and treatment solutions.

Typed instructions on a screen or video frame are provided to guide the user or to elicit a response to a particular condition. Student responses are processed with an either/or condition. If correct, the next item in sequence is displayed. If incorrect, the student may be given the option of selecting another response from the original list or may be directed to a similar but differently stated question. By using branching logic, the author can allow the program to ask the student to do remedial work or to select lower level test questions until mastery of the lower level work is achieved. Once mastery is achieved, and not until then, the student can progress to a higher level.

Course management is controlled or provided by authoring systems to include the capability to select a particular type of instructional method or strategy, drill, or tutorial process best suited to the lesson. These systems allow the user to manage instructional material development and create the most effective instructional program. Detailed data are generated to provide the author with a history of the most correctly answered questions and those which are never answered correctly. Courseware upgrading and modification are provided through this process.

Limitations of the current authoring systems and languages revolve around their ineffectiveness in fully utilizing video and audio materials directly in the development of instructional material. Videotapes and videodisc equipment are becoming more popular. Modest attempts are being made to interface these media with computer-based instruction, but not on a large scale. The ability to modify graphics is also a common weakness of current programming packages, as is the lack of effective simulation material. Attempts are being made to develop knowledge-based systems rather than frame-oriented approaches to courseware development. Knowledge-based systems include related concepts and inferences such as the process to interface graphics and video materials with the computer-based instructional material.

Testing by using the immediate response/reward technique in courseware is becoming more popular. A student can be rewarded for an accurate response immediately rather than wait until the tests have been graded and returned by the instructor. The results of the student's interaction with the computer program can be recorded at the time the student makes the response. The number of times a student responds to any single component of the testing process can, likewise, be recorded to determine the time on task and length of time to learn specific tasks accurately. Very precise measurement is possible with the newer courseware packages.

The use of authoring languages has increased the ability of the instructor to work effectively with specific difficulties that students are having with lessons. They have also opened the doors for instructors who have little knowledge of computers and programming to develop effective testing programs within their classroom facilities. A simple authoring package such as LOGO will be useful to instructors in many classroom applications. However, test programs are generally produced using BASIC languages. An example of creating a test is provided below as a descriptive sample. This program, created by a teacher in Colorado, is used only to show how simple the development of a test can be using an available program:

- Step 1 Boot the computer with the program disk and type in a six character word for your test, e.g., AM 2.2 (spaces count).
- Step 2 You are prompted for a test number, enter 1. The drive to store data must be identified also. Enter 1.
- Step 3 Prompt: create/delete test (1) enter 1. The other items on the menu will be used later.
- Step 4 Press 1 to create rather than delete test on next screen. If you press 2, you can delete any test named.
- Step 5 You are asked whether you want to add to a section or to create a new section. Press 1 to create a new section.
- Step 6 You are asked to choose between four types of questions. Press 2 for True/False questions.
- Step 7 You are given a choice to have a header and/or instructions for the section of tests. Press Y or N. If Y, the program will give you direction for moving the cursor and to tell the computer you are done (D).
- Step 8 You will be asked if you desire randomized questions and a number of other choices including how many multiple choices do you want if you chose M/C type questions.
- Step 9 You will now be asked to enter all questions. The order of response is: heading/instruction, question, answer (if T/F or M/C). If you are adding to a section, you would only go through question and answer.

Step 10 You are allowed to review the test created by using the main menu. Choices 5 or 6 are test editors on the main menu. These are used to examine and revise questions. Choice 4 will allow you to print all questions and/or answers sequentially.

Step 11 Main menu selection 3 will allow you to print the test as you have created it.

The results of your labor are depicted here. We entered an instruction to read accurately before responding, and we titled the section AM 2.2. The sample is test one of a possible thirty tests for the section. Four questions with the appropriate responses are given as if we had chosen item 4 on the main menu to print out all the questions and/or answers sequentially.

QUESTIONS FOR AM 2.2—TEST 1 (Step 10)

TRUE-FALSE QUESTIONS

1. The auto is a new machine
Correct answer — False
2. Oil is used primarily for cooling
Correct answer — False
3. Gas mileage is dependent on speed
Correct answer — True
4. All standard transmissions use 90 wt oil
Correct answer — False

BE CERTAIN TO READ THE QUESTION ACCURATELY BEFORE RESPONDING

1. The auto is a new machine
A. True B. False

This is, admittedly, a very simplistic example of a test creation program, but it does show the rudimentary components of creation. The results are scored by hand in this example. It is only a test maker, not a grading program. Instructors should be certain that the program they choose meets their needs for both creation and grading, if that is what they desire. The more complex programs do much more, as stated earlier.

Another example of a program for managing grades and test results is explained in this sample:

Dick Johnson

Date 07/25/84

Suspension Systems

*Session Three

Code Subjects	PTS	Max	WT
1 Inspect and Service	8	10	5
2 Spindle Repair	12	15	5
3 McPherson Strut	12	15	7
4 Springs and Torsion	13	15	7
Totals	275	335	

Dick Johnson

Average: 82.07

FINAL GRADE: C

In this example, the student grades are keyed into the program by the instructor. Each test component has been given an assigned point range and has been weighed. Some components of the learning process are considered to be of greater value than others; therefore, a higher weight has been assigned to indicate more accurately the effect of responses to those components. This student received a total of 275 weighted points out of a possible 335. The program provided an average grade of 82.07 and assessed a final grade of "C" for this section.

The program will also create a histogram for the class and provide a listing of the number of A's, B's, etc., achieved. The determination of the score assigned to a grade was programmed into the system by the instructor by using a range such as 75-85 equals a "C." This same program could be used to automatically enter scores from tests directly from a computer or could be used with a card reader if properly written.

Testing in vocational programs can be very complex. The advent of authoring languages and systems will provide a medium with which instructors can effectively monitor student progress. These languages have had a tremendous impact on the microcomputer field. One language, SmallTalk, is credited with the immediate success of a feature known as windowing. With the use of windows, a user can display various components of a spreadsheet or

similar application on the screen at one time. SmallTalk was the major technical element which made the Apple Lisa popular. Its effect has been felt in almost every computer that is able to use a "Mouse." The software necessary for programming a Mouse is based on SmallTalk. Today, testing programs even allow a student to point to the correct response by using a Mouse.

Many simple authoring languages are available in various software formats. D.R. LOGO and PC LOGO are two of these. LOGO is an extremely popular program that is used to teach elementary students how to operate computers. SmallTalk is an outgrowth of the work done at MIT using LOGO. SmallTalk is both a language and an operating system, much like DOS, which allows it to control the operating features of the computer as well as the data input and storage. This allows the commands for the Mouse to be an integral component of the display messages on the screen in addition to being able to file, erase, or compute results.

The only limit to the utilization of testing programs is the cost of the software. As stated earlier, much of the software is readily available through user groups or is inexpensive to purchase from other instructors. While these packages have their disadvantages, they may provide the best approach to begin a testing program. The benefits far outweigh the effort.

SUMMARY

Computer-based testing in vocational education programs is becoming a more popular choice than the traditional use of a gradebook. Testing programs can provide any information currently stored in a gradebook or in card files. The major benefits of a testing program include the immediate use of test items from a bank which will allow instructors to prepare multiple versions of tests without having to re-enter test questions each time.

Tests can be prepared in random order by item, by level of difficulty, and in various forms of questioning modes, and can be scored and graded without extra time and effort by the instructor. Class averages can be prepared, along with progress charts and individualized results, for each student in much the same manner as report cards. Data are stored permanently for use at a later date, such as in conducting a longitudinal study of class performances or for determining the relative effect of individual test items.

There are some points to consider when selecting appropriate software to use in a vocational program. These generally relate to the type of material to be entered and the type of data that can be handled by the software. The capacity of the program, type of display or report that can be prepared, and the difficulty of adding data to the student files are major considerations. Ease of entry of test questions is also a major element to consider.

Several descriptions of software programs are presented for the reader to compare features. Many locally developed packages are as valuable to the classroom teacher as commercially prepared material, but they are generally limited in both capacity and features.

The language used to create testing programs is usually BASIC to allow the user to modify statements and to personalize printed material. Most good commercial software have these features in addition to the advantage of being more powerful because they are written in PASCAL or some other advanced language. They are generally much faster and provide additional features, such as histograms, class averaging, and more advanced report generating capabilities.

Authoring languages and authoring systems have revolutionized the classroom use of computers. The benefit of these languages is that it is not necessary for teachers to learn programming. The authoring languages have compressed the features of basic programming into more global commands which reduce the time needed to write specific commands. Authoring systems take this feature an additional step by providing guides in the form of the program prompts which allow the user to prepare instructional material by setting up the sequence and method of instruction only. The prompts describe the various actions to be taken, such as branching or looping to previous steps for remedial purposes. The time needed to develop instructional packages is still considerable, often requiring up to 200 hours of time to create one hour of computerized instruction.

There are some limitations with authoring systems. The current models are based on a frame-oriented approach which does not take full advantage of the capabilities of video tapes or videodiscs. Until the knowledge-based format becomes more practical, instructors will still need to rely on screen images which are less graphic. The true beauty of computerized testing programs lies in the ability to manage more data in more ways than any traditional classroom would need or be able to fully utilize. The competency-based format is natural for computerized testing because of the level of specificity of a competency-based approach to instruction. Any variable can be matched to any other variables to select the most appropriate learning environment or testing mode.

The more simplistic models are valuable to most instructors because of their cost and immediate application. Their advantages over traditional recordkeeping systems are evident in the time saved by not having tests retyped each time a new test is required and in the ability to have multiple versions of all tests available at any time.

ACHIEVEMENT INDICATORS

- 1) Discuss reasons for the popularity of computer-based testing programs.
- 2) Distinguish between a test-generated program and a computerized testing program by listing the advantages of each.
- 3) Describe the points to be considered prior to utilizing computer-based testing in a vocational program.
- 4) List the advantages of a computer-based testing program over the use of a gradebook.
- 5) Prepare a list of items to compare when selecting a computer-based testing program. Ask a salesperson to demonstrate features of software being considered using the list prepared.
- 6) Distinguish between an Authoring Language and an Authoring System by describing the purpose of each.
- 7) Describe the three major types of Authoring Systems by listing the specific differences among them.
- 8) Discuss the advantages and limitations of current Authoring Systems and give examples of the potential use of these systems in vocational programs.

RESOURCE LISTING

Classroom Manager
William Tedder
Information Outreach, Inc.
P.O. Box 10456
Denver, Colorado 80210

Grade Management
Karl Jahns
BertaMax, Inc.
\$39.95

Test Composer
Vernon Johnson
BertaMax, Inc.
\$59.95

Generalized Instructional
Management System
Edward Beardslee
BertaMax, Inc.
\$350.00

SmallTalk
Xerox Learning Research Group
Palo Alto, CA 94043

D.R. LOGO
Digital Research Inc.
P.O. Box 579
Pacific Grove, CA 93950

Plato
Control Data Publishing Co.

LOGO
MIT LOGO Research Group
18 Vassar Street
Cambridge, MA 02139

Gradekeeper
Norman D. Hardy
BertaMax, Inc.
3646 Stone Way North
Seattle, Washington 98103

Gradekeeper
Norman D. Hardy
BertaMax, Inc.
\$49.95

Test Maker
Karl Jahns
BertaMax, Inc.
\$39.95

Test Writer
Edward Beardslee
BertaMax, Inc.
\$24.95

IBM LOGO
IBM Systems Product Division
P.O. Box 1328
Boca Raton, FL 33342

Tutor
Control Data Publishing Co.
P.O. Box 261127
San Diego, CA 92126

Coursewriter
IBM Systems Product Division
P.O. Box 1328
Boca Raton, FL 33342

Unit 4

Manage a Vocational Student Organization

SPECIFIC OBJECTIVE

Upon completion of this unit, the learner will be able to use a microcomputer as an aid to managing a vocational student organization. This knowledge will be demonstrated through completion of the unit achievement indicators at the end of this unit.

UNIT OBJECTIVE

Upon completion of this unit, the learner will:

- 1) Identify specific vocational student organizations related to his/her vocational curriculum.
- 2) Understand the relationship between vocational student organizations and vocational curricula.
- 3) Understand the management functions related to vocational student organizations which may be implemented by advisors and student members.
- 4) Know the types of microcomputer software which may be used to execute management responsibilities.
- 5) Know at least four student organization management responsibilities which may be implemented by utilizing microcomputer software applications.
- 6) Help a student organization member execute a management plan.

Manage a Vocational Student Organization

BY: EMMA GEBO

Vocational instructors have a responsibility to be familiar with the philosophy, purposes, and government structure of vocational student organizations related to their occupational areas. The Policy Statement of the United States Department of Education for Vocational Student Organizations recognizes the programs and philosophies embraced by vocational student organizations as integral parts of vocational education instructional programs (1981). Nine vocational student organizations and related occupational areas are currently recognized by the United States Department of Education:

American Industrial Arts Student Association (AIASA) — elementary, junior, and senior high school students in industrial arts and related occupations.

Distributive Education Clubs of America (DECA) — secondary and post-secondary students in marketing merchandising and management.

Future Business Leaders of America—Phi Beta Lambda — secondary (FBLA) and post-secondary (PBL) students in business.

Future Farmers of America (FFA) — agribusiness, natural resources and environmental science, horticulture, and forestry occupations.

Future Homemakers of America (with FHA and HERO chapters) — junior and senior high students in home economics and related occupations.

Health Occupations Students of America (HOSA) — secondary and post-secondary students in health occupations education.

National Post-Secondary Agriculture Students Organization (NPASO) — post-secondary students in agriculture, agribusiness, and natural resources industries.

Office Education Association (OEA) — secondary and post-secondary students in office occupations education.

Vocational Industrial Clubs of America (VICA) — secondary and post-secondary students in industrial, technical, and related occupations.

The Vocational Student Organization

Vocational student organizations (VSO), as integral parts of vocational education, promote the concept of total student development. The United States Department of Education has stated, since 1974, that VSOs are intracurricular in nature. Consequently, vocational educators have been able to carry out VSO activities as a part of classroom curricula during the regular school day.

The nine vocational student organizations are similar in focus and purpose. The author of this unit has, in workshops, invited vocational educators from all disciplines to compare the purposes of the VSOs. Participants have consistently identified similar emphases: leadership, communication, democracy, occupational goal setting, self development, cooperation, competition, citizenship, work ethic, and community involvement. The differences noted in the VSO purposes relate primarily to the preparation needed for specific discipline related occupations.

Student involvement in vocational student organizations may serve as a method for developing essential qualities of leadership, cooperation, citizenship, and service. As students enter the workforce, these are qualities which may serve to make students promotable as well as employable. Microcomputers can be utilized as tools to help promote many of the purposes of vocational student organizations. Specific examples of microcomputer applications contained in this unit may be related to vocational student organization purposes.

Role of the Advisor

As an advisor to a vocational student organization, it is the instructor's role to guide and encourage student members. The teacher is not the leader! Students are the leaders of the organization. As advisors, vocational teachers use student organizations as tools of instruction which reinforce, through activities, the vocational content which students learn in the classroom or on the job. Vocational programs improve job effectiveness when student organization activities are integrated with instruction. Figure E.10.1 illustrates the desirable interrelationship among instruction, occupational experience, and the vocational student organization.



Figure E.10.1 Integration of student activities and instruction

The organized presentation of essential knowledge, skills, and attitudes is made by the instructor in the vocational classroom. The application of the knowledge, skills, and attitudes occurs in the actual work setting of a supervised occupational experience. Vocational student organization activities are used to link curricula with potential occupational experiences. Leadership and cooperation, as learned and promoted through vocational student organizations, can be used to develop the total student. Vocational student organizations assist teachers in teaching attitudes and skills which relate to obtaining and keeping job skills which may not be taught as a part of the skill-oriented vocational course.

The authors of *A Competency-Based Approach to Development of a Fun and Effective Vocational Student Organization* (Arizona, 1983) emphasize the importance of combining classroom instruction and participation in vocational student organizations. These authors identify five job survival competencies which can result from an integrative approach: authority and responsibility, work ethic, conflict management, human relations, and employment. Authority and responsibility are defined as an employee's ability to understand and meet employer's expectations regarding job performance. Work ethic is the quality demonstrated by an employee who arrives on time ready for work while taking pride in the finished product. Conflict management involves the ability to manage disputes in the workplace in a constructive manner. Human relations are evidenced by one's ability to maintain appropriate relationships with personnel in the workplace. Finally, employment is gained through competence in interview techniques required when applying and securing a position.

The Purposes of the Vocational Student Organization

The purposes of the specific vocational student organization should be included in the total curriculum. A VICA purpose, for example, is "to promote high standards in trade ethics, workmanship, scholarship, and safety." This purpose may be implemented in the classroom by utilizing a system of peer evaluation and supervision of work completed in an industrial or technical program. An OEA purpose, "To assist students in establishing realistic training and employment objectives," might be implemented by having classroom guests employed in business and office occupations participate in a panel discussion related to job responsibilities, conditions, training, and other factors. Students might use information learned from this student organized discussion to make personal decisions for their futures. A DECA purpose, "Develop progressive, competent, self-reliant, and cooperative leadership in the field of distribution," might be realized in the classroom as students collectively plan the completion of a project related to a product which they may be marketing.

The preceding examples for vocational instructors are intended to provide suggestions for implementing the purposes of vocational student organizations in classrooms. Students have the responsibility of decision making and leadership indicative of a member-centered leadership. It is imperative that vocational teachers be **advisors** for vocational student organizations—not leaders.

Specific information regarding each of the vocational student organizations may be obtained by reviewing the resources listed for this unit or by writing to the respective state or national student associations. A listing of national student organization addresses is included in the reference section of this unit.

USING THE MICROCOMPUTER TO MANAGE THE VOCATIONAL STUDENT ORGANIZATION

Teachers who use microcomputers as teaching, planning, evaluating, managing, and organizing tools should consider integrating microcomputers into the management of vocational student organizations. As an advisor, the vocational teacher provides the continuity necessary for the vocational student organization to prosper year after year. The advisor serves as a helper, resource person, and manager of information. Bush and Cobb (1984) suggest that microcomputers may be used to relieve classroom teachers of many of the managerial tasks which often burden them. They suggest that computers be used to record and store student records. Teachers should be aware of the ways in which computers offer the more efficient use of time. It is important for in-services to include demonstrations of recordkeeping programs and to emphasize that the use of such programs permits more time for the truly creative aspects of teaching (Widmer and Parker, 1984).

The management of information for vocational student organizations should be conducted by advisors and the membership/leadership of the organizations. Vocational student organization purposes related to leadership, self-development, cooperation, and work ethics may be further developed as a part of this management process. Microcomputers and appropriate software can serve as aids to this management process. The following discussions are pertinent to advisor and student roles in management and information processing.

* **Maintaining files:** Computers may be used as electronic filing cabinets for the storage and retrieval of information. Advisors and appropriate student officers may utilize software to store individual student member profiles. These profiles might include date of affiliation, leadership position held, committee membership, participation in competitive events, awards and recognitions received, and other specific information pertinent to the organization. Data management and filing software may also be used to maintain files of local advisory committee members (including addresses for mailings); to maintain files concerning local honorary members of the organization along with recommendations for state and national honorary members; and to maintain chapter information and records such as officers, competitive events, program of work, an organizational chart, and chapter accomplishment for any given year or period of years. A file program may also be utilized to organize competitions. The file program could organize in minutes what would require hours to accomplish manually.

* **Budgeting and finances:** A variety of electronic spreadsheets designed to simplify budgeting and record-keeping are available for advisors and student leaders. Appropriate software may be used to keep a record and proposed budget and actual expenditures for student organizations; to keep a record of dues payments and affiliation information; and to keep a record on money-making projects undertaken by the student organization. Software may also be used to balance the organization's checkbook and ledger, or school account.

* **Word processing:** Computers may be used by advisors and students to write newspaper articles or other public relations materials, record minutes of the organization, write letters and reports, and print labels for the student organization. Deleting text, inserting words, and rearranging entire reports save time and simplify the task for both students and advisors. In addition, retaining a copy of the constitution and by-laws of the organization in the microcomputer files can facilitate making amendments to or revisions of this governing document. Many word processing programs offer these capabilities for vocational student organization advisors and students.

* **Information access:** As more students begin to utilize the capabilities of the microcomputer, the possibilities to link-up with each other via telephone lines will increase. The use of a modem permits access to a broad range of information. Users will also be able to send and receive electronic mail and carry out a variety of transactions using the microcomputer.

Microcomputers are not the total answer to vocational student organization management, but they are tools to help advisors and student members with the management functions of the student organization.

This unit makes a variety of recommendations which student organization advisors may use to meet the needs of specific vocational student organizations.

SUMMARY

This unit presents information regarding the vocational student organizations recognized by the United States Department of Education and suggests methods for incorporating microcomputers as tools to help manage a vocational student organization.

Vocational student organizations are integral parts of vocational education. Through the purpose of the VSO, desirable personal qualities of leadership and cooperation are developed. Three major components of vocational curricula are classroom instruction, supervised occupational experience, and the vocational student organization. The vocational student organization serves as a link for the other two components for vocational curricula and as a means for educating students to be promotable and employable.

The management of vocational student organizations is the responsibility of advisors and student members. This unit identifies four approaches to integrating microcomputers in the management process: maintaining files, budgeting and finances, word processing, and information access. These management functions can enhance the purposes and goals of vocational student organizations.

Microcomputers may be used by vocational teachers to assist in the management of a vocational student organization. The microcomputer is a labor-saving device which frees teacher's/advisor's time for more creative aspects of teaching.

ACHIEVEMENT INDICATORS

- 1) Identify the vocational student organization which is appropriate for your vocational program.
- 2) Discuss three benefits which may be derived from the integration of a vocational student organization and the vocational curriculum.
- 3) Describe three management functions related to a vocational student organization which are the responsibilities of the advisor and student members.
- 4) Describe four kinds of management functions which may be implemented with the assistance of the microcomputer.
- 5) Develop a plan for the management of at least four student organization-related responsibilities which may be conducted in a vocational program by utilizing appropriate microcomputer applications.
- 6) Help a vocational student organization member execute a management plan.

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- Bush, W. S., and Cobb, P. (1984). Using the Computers in the Classroom: A Problem for Teacher Educators. *Action in Teacher Education*, V (4), 9-14.
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- Illinois State Board of Education (1979). *Illinois Vocational Student Organizations Local Advisor's Handbook*.
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- United States Department of Education (1981). Policy of the United States Department of Education for Vocational Education Student Organizations. Washington, D.C.

VOCATIONAL EDUCATION STUDENT ORGANIZATIONS

- American Industrial Arts Student Association (AIASA) — 1908 Association Drive, Reston, VA 22091
- Distributive Education Clubs of America (DECA) — 1908 Association Drive, Reston, VA 22091
- Future Business Leaders of America - Phi Beta Lambda (FBLA-PBL) — 1908 Association Drive, Reston, VA 22091
- Future Farmers of America (FFA) — 5630 Mount Vernon Highway, Alexandria, VA 22309
- Future Homemakers of America (FHA and HERO) — 1910 Association Drive, Reston, VA 22091
- Health Occupations Students of America (HOSA) — Baynard Building, Suite 206, 2 East 7th Street, Wilmington, DE 19801
- National Post-secondary Agriculture Student Organization (NPASO) — Box 34, Cobleskill, NY 12043
- Office Education Association (OEA) — 1120 Morse Road, Columbus, OH 43229
- Vocational Industrial Clubs of America (VICA) — P.O. Box 3000, Leesburg, VA 22075